

### ABSTRACT OF THE DISCLOSURE

There is described a three-dimensional imaging system for acquiring a succession of two-dimensional images of a target volume represented by an array of pixels and transforming the succession of two-dimensional images directly into a three dimensional image. Generally, the system comprises a scanner, a memory and a transformation means. The scanner scans the target volume using an angular scanning technique, and generates a succession of digitized two-dimensional images thereof representing cross-sections of the target volume on a plurality of planes spaced around an axis of rotation of the scanner. The memory stores the succession of digitized two-dimensional images and a data set. The data set comprises: (i) calibration parameters defining the geometric relationship between successive digitized two-dimensional images; and (ii) acquisition parameters defining the geometric and orientational relationship between successive digitized two-dimensional images. The transformation means receives the digitized two-dimensional images and the data set, and transforms the digitized two-dimensional images directly into a three-dimensional image of at least a portion of the target volume. The system is particularly suited to display a three-dimensional image from two-dimensional images which are acquired by a fan- or axially-acquired ultrasound image data.